

# The Builder.

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**B**URING the past week we have attended a series of experiments on the strength of iron girders made by Mr. Thomas Cubitt, at his place of business at Thames Bank.

The object was to try the absolute and comparative strength of different forms of section, partly to assist Mr. Cubitt and Sir Henry Delabèche in their inquiry into the cause of the accident at Oldham (on which their report is anxiously looked for), and partly because it is the custom at that establishment to leave no means untried to prove every thing that they are about to use, and arrive at the most certain information on all that relates to construction. The greatest care was exercised to obtain an exact result. Force was applied by means of the hydrostatic press to the centre of girders with 15 ft. bearing. The deflection caused by each successive ton weight (or that which represented weight) was measured, as was also the set permanently acquired by the girder at each stage of the proceeding, and the exact weight by which at last they were severally broken was recorded. These details, with the form of section, we propose to lay before our readers in an early number of the journal. In making these experiments the difficulty of obtaining a perfectly sound casting, and the consequent danger of using cast-iron girders without proving them, was strikingly apparent.

Wrought-iron girders at reasonable cost are a desideratum; and there is no difficulty in the way which could not be overcome. Mr. Cubitt suggested that a few premiums offered by Government for the best wrought iron beams above a certain size would probably lead to such an improvement in the machinery used, that they might be drawn of large dimensions at little more cost than cast beams. It is to be hoped that he will urge this on the Government in the forthcoming report, and that it may be acted on. A series of experiments on cast and wrought beams should likewise be undertaken by Government forthwith, as, from the expense attending them, individuals cannot be expected to work out the question fully. When the amazing difference in strength produced simply by a different disposition of the same quantity of metal is seen, the importance of a full and minute inquiry to ascertain the best disposition of the metal—the best form of section in other words—must at once be evident.

Mr. Cubitt's establishment offers many subjects of great interest for consideration, and it is of these we propose to speak briefly in the present article. A minute description of it, shewing its extent, comprehensiveness, and completeness—the modes of economising labour, and the new processes employed, would be equally instructive and interesting. As, however, this would excite curiosity, and lead to applications, which the proprietor would be compelled to refuse on account of the interruption they would cause, we will speak rather of the results, and the motives which are seen to prevail, than of the works themselves.

Amongst the most important of the latter, apparent at every step, is a desire to raise the

condition of his workmen; a desire so wise and so good, that we cannot praise it loudly enough, or set it forth for imitation too forcibly. The men literally work in drawing-rooms, large and lofty (the carpenters' shop is above 200 feet long), equably heated and well ventilated. Attached to each shop is an apartment for cooking, with oven, boiler, and hot-plate, where they may dress their dinner, or prepare their tea. And here, high up under the roof, are rails, where they may dry their coats after a wet walk to their work. In order to prevent the men, as far as possible, from acquiring the habit of drinking spirits in the morning, facilities are given, so that, on their arrival at six o'clock, they may have a cup of hot coffee, or cocoa, by arrangement amongst themselves, on payment of one half-penny. The consumption being large and certain, one halfpenny pays the expense of a cup of coffee, a fact that speaks volumes, and points the way for an amazing increase of the personal comforts of the operative classes. Hot water is used to heat the shops, and the range of water-closets belonging to each department is ventilated by superfluous warm air.

In the smith's shop, in the mason's shop,—one usually so smoky, the other so wet,—all is clean, dry, and warm, and here, as the shops themselves are hardly suited for eating in, there is a dining-room, with tables and benches, connected with the cooking apparatus. When to all this we add that there is a lending library comprising some of the best scientific and elementary books, and a room supplied with the daily papers to which the foremen have access at particular hours, it will be seen how much the comfort of the men is studied.

The result, it is gratifying to know, is exactly what might be expected. The best workmen are anxious to be employed there: a drunken man is unknown in the establishment,—a man who cannot trust himself hardly ventures to ask to be employed.

The arrangements to prevent accidents by fire, so important and often so little regarded, are very complete. The most important parts of the building are fire-proof, and in other places where this was not so practicable, portions are made fire-proof, in order to cut off the connection, and stop the spread of the flames. Along the side of the carpenters' shop are cisterns supplied with water to extinguish instantly any outbreak, and around the building are mains constantly charged, and hose ready for emergency. The stables are wholly fire-proof and complete in all respects.\*

The plasterers and modellers' shops will afford many lessons in design, and here may be observed one of the numerous arrangements for economising labour and obtaining a satisfactory result, which occur throughout the establishment. High up, above where the modellers sit, is a large looking-glass framed and so regulated by pulleys and cords, that the modeller has but to turn his head to see the appearance which would be presented by the work on which he is engaged if raised to any particular height.

Steam plays a very important part in the establishment; it is sawing timber, polishing marble, pumping water, preparing food for the horses, and clipping bars of iron irresistibly. As we have already said, however, we may not go into details, and with the remark that there are excellent arrangements for preparing the

\* Each horse is supplied with a lamp of rock salt placed in a compartment of the manger. The pavement of the stable (granite pitching laid in asphaltum on concrete foundation with a layer of broken glass in centre of concrete to keep back the rats). It is sprinkled periodically with plaster of Paris saturated with sulphuric acid, to absorb deleterious matters.

timber and deals for use, we will close our present notice of this extraordinary result of one man's energy and power.

The chimney-shaft attached to this establishment presents several peculiarities, to which we shall refer in a separate article.

## MR. COCKERELL'S THIRD LECTURE ON ARCHITECTURE.

PROFESSOR COCKERELL gave the third lecture of his course at the Royal Academy, on Thursday, the 24th ultimo, and was listened to throughout with great attention.

He proposed on that occasion to direct their notice to the civil architecture of the ancients, to the gymnasium, the forum, and the bath. The form of the temple, a parallelogram, admitted very little variety except as to the order used, and its size: nothing was left to the architect. The refinements which were gradually introduced in temple architecture had been recorded, fortunately for us, by the faithful Vitruvius, whose accuracy was confirmed by recent investigations. He mentioned particularly Vitruvius's description of the pyramidal tendency of the temples, obtained by inclining the axes of the columns until the inner line of the columns was perpendicular, and of the elevation given to the centre of long horizontal lines such as the entablature and ridge, in order to overcome an optical illusion by which a long level line was made to appear inflected. The precise rule for this elevation had been deduced from the Parthenon through the researches of Mr. Pennethorne. The professor illustrated the present state of Athenian antiquities by Mr. Knowles's drawings, already mentioned in our journal.

Civil architecture, he went on to say, afforded much more scope to the architect. It flourished during 500 years, namely from the reign of Alexander to that of Constantine, and its principles became as fixed as those which guided the erection of temples. In the time of Alexander canons were laid down which are as applicable now as they were then—they have endured through all the changes of fashion and caprice, and are clear to all who have respect for them in their hearts, and will study them with a proper feeling. The study of Vitruvius had been recommended by the greatest masters: the execution of his book had been forced on Vitruvius by Augustus. Palladio said, from his youth upwards Vitruvius had been his study; Vignola, Serlio, and others said the same thing. All modern architecture had sprung from ancient art. Ancient buildings had been fully explained to us in modern times, especially by Canina, whose work was worthy of the glorious country of which it treated. British architects had an opportunity to reproduce every style in its proper climate: the sun never went down on the British dominions, and our colonizing architects should study the works of all countries. Cast-iron would lend itself usefully to a columnar system, and many modern appliances might be used, but for design we must still go to the ancients. The arch afforded us facilities: it was doubtless used in Greece, but the Romans had first united it to a columnar system and employed it every where. We had no excuse for neglecting the study of ancient works; modern travellers and writers had afforded us increased facilities. The merits of Vitruvius he had long maintained against fashionable detractors, and would continue to do so.

The professor then alluded to ancient cities, and described their arrangement. The great streets crossed each other at right angles with colonnades through the heart of the city; these were sometimes deflected slightly, so that their extent was never seen. There was an example of this at Palmyra. Chester might be restored to afford a very fair approximation to a Roman town. He recommended for study the article "Cité" in Quatremère de Quincy's fine work. The arrangement of towns was most important for those who went to the colonies; mistakes made in a new settlement, in the first instance, were usually perpetuated and injured all that was done after. He then described with the aid of drawings, the principal buildings in an ancient city. The agora of the Greeks, and the forum of the Romans, had been well illustrated by Vitruvius. The former was used for gladiatorial shows before amphitheatres were